Question #1: What is a healthy Puget Sound?

GOAL	DESIRED OUTCOME	PROVISIONAL INDICATOR	EXAMPLES OF WHAT SUCCESS MEANS...
1. A healthy human population supported by a healthy Puget Sound that is not threatened by changes in the ecosystem. Short name: *A healthy human population*	Fish and shellfish are safe for people to eat	Marine fish consumption advisory	Less restrictive dietary advice (compared to DOH human health evaluation) as concentrations decline
		Acres and trends in shellfish commercial growing area closures	Net improvement of 1,000 acres per biennium; net improvement of 10,000 acres by 2020
		Shellfish closures and biotoxin levels for paralytic shellfish poison (PSP)	No illnesses or deaths from exposure to PSP
		Shellfish closures and biotoxin levels for domoic acid	No illness or deaths from exposure to domoic acid
		Shellfish consumption advisory	Baseline evaluation and advice, then less restrictive advice as concentrations decline
		Freshwater fish consumption advisory	Baseline evaluation and advice, then less restrictive advice as concentrations decline
	Air is healthy for people to breathe	Washington Air Quality Advisory (WAQA) index	Increased number of good air quality days measured by WAQA index per monitor compared to 2007 baseline
		Air quality – particulates	No days with 24-hour concentrations of fine particulates (PM2.5) above goal of 20 ug/cubic meter
	Freshwaters are clean for drinking	Drinking water quality in public water systems	1.Decrease in percent of public water supply sources with elevated nitrate 2.Decrease in percent of public water supply sources with significant increases in nitrate levels
		Groundwater quality for drinking water	Reduced levels of arsenic and nitrate in ground waters used as drinking supplies
	Marine and freshwaters are clean for contact	Percent of swimming beaches that meet safe swimming standards at all times during the summer	Increase in percent of swimming beaches that meet standards at all times in the summer
2. A quality of human life that is sustained by a functioning Puget Sound ecosystem. Short name: *Human well-being*	Aesthetic values, opportunities for recreation, and access for the enjoyment of Puget Sound are continued and preserved	Puget Sound recreational shellfish harvests	Sustained (?) levels of annual harvest by species from individual beaches; sustained (?) aggregate annual harvest from Puget Sound beaches
		Puget Sound recreational finfish harvests	Increased (?) levels of annual harvest by species for individual catch areas; increased (?) aggregate annual harvest for Puget Sound
		Puget Sound non-harvest recreational activity	Increased (?) participation and frequency of activity for various recreational activities
		Puget Sound publicly accessible or owned shoreline	Increased number of miles of Puget Sound shoreline that is publicly owned or publicly accessible
	Upland and marine resources are adequate to sustain the treaty rights, as well as the cultural, spiritual, subsistence, ceremonial, medicinal needs, and economic endeavors of the tribal communities of Puget Sound.	Puget Sound commercial Indian finfish and shellfish harvest	Increased (?) levels of annual harvest by species for individual catch areas; increased (?) annual aggregate harvest for Puget Sound
	The Puget Sound ecosystem supports thriving natural resource and marine industry uses such as agriculture, aquaculture, fisheries, forestry, and tourism.	Puget Sound commercial finfish and shellfish harvest, wild and aquaculture	Increased (?) levels of annual wild and aquaculture harvest by species for individual catch areas; increased (?) annual aggregate wild and aquaculture harvest for Puget Sound
		Scenic and sightseeing water transportation	Sustained (?) number of scenic and sightseeing water transportation establishments in each county
		Marinas	Sustained (?) number of marinas in each county
		Puget Sound timber harvest	Sustained (?) volume of timber harvest for each county and each ownership category
		Puget Sound land in farms	Sustained acreage of land in farms in each county
	The Puget Sound's economic prosperity is supported by and compatible with the protection and restoration of the ecosystem.	Total population	
		Developable land	

GOAL	DESIRED OUTCOME	PROVISIONAL INDICATOR	EXAMPLES OF WHAT SUCCESS MEANS...
3. Healthy and sustaining populations of native species in Puget Sound, including a robust food web Short name: *Healthy and sustaining species and food webs*	Viable marine, nearshore, freshwater, and terrestrial biological communities exist into the future and biodiversity is maintained	Species Listed under Federal Endangered Species Act (ESA)	1.Maintain existing populations of federally listed species in a stable condition 2.Net decrease in number of species listed
		Species of Concern on State list	Net decrease in numbers of species listed
		Species on Conservation Concern	Net decrease in numbers of species listed
		Marine benthic infaunal community structure	All Puget Sound benthic infaunal communities have abundance and diversity measures appropriate for the type of sediment they inhabit and are not dominated by stress-tolerant species
		Terrestrial breeding bird count	Stable or increasing population trends by 2020 for all bird species of greatest conservation concern or identified as indicators by Partners in Flight
		Marine bird mortality	
		Fish and invertebrates at marine reserves	Net decrease in numbers of species listed
		Marine species at risk	
	Populations of marine, nearshore, freshwater, and marine species are viable into the future and biodiversity is maintained	Bald eagle	
		Pinto abalone	
		Groundfish	
		Herring	
		Marine birds – breeding and non-breeding	Stable or increasing breeding and over-wintering marine bird species population trends by 2020
		Southern resident orca whale population trends	
		Salmon and steelhead	Achieving watershed-specific recovery targets from federally-approved recovery plan
		Taylor's checkerspot butterfly	No loss of extant breeding populations and all populations categorized as stable or healthy by 2020.
		Peregrine falcon nesting surveys	
		Pacific hake & other midwater fish status and trends	
		Marine/shore birds – food web interactions	
		Black oystercatcher abundance at nesting colonies	
		Harbor seal	
		Gray whale	
		Harbor porpoise/Dall's porpoise	
		Waterfowl breeding surveys	
		Band-tailed pigeon mineral site counts	
		Mountain goat	
		Deer population	
	Non-native species do not significantly reduce native species viability or impair food web function	Non-native invasive species threat in all habitats	Decrease in number of rare native species that are impacted or threatened by invasive, non-native species
		Non-native nearshore species	
	Biological harvests are balanced, viable and ecosystem-based	Dungeness crab	
		Marine associated waterfowl harvest	
		Game species	
		Marine bottomfish	
		Harvest of wild salmonid populations	
		Exploitation rates of wild salmonid populations	

GOAL	DESIRED OUTCOME	PROVISIONAL INDICATOR	EXAMPLES OF WHAT SUCCESS MEANS...
4. A healthy Puget Sound where freshwater, estuary, near shore, marine, and upland habitats are protected, restored, and sustained Short name: *Protected, restored, and sustainable habitats*	Marine/nearshore habitats sustain diverse species and food webs and are formed by natural processes and human stewardship so that ecosystem functions are sustained	Eelgrass	Increase in eelgrass distribution to: a)maximum areal extent and depth measured since 2000 (short-term) b)maximum areal extent and depth evident in historical maps and other sources of information (long-term)
		Marine parameters	1.Increase in Puget Sound water clarity by 2020 2.Increase in oxygen concentrations by 2020
		Marine shoreline geomorphology	Conservation of important ecosystem features and successful restoration of "lost" ecosystem features
		Kelp and other seaweeds	Extent of canopy-forming kelp beds sustained (?) at ___ baseline conditions
		Saltmarshes	Increased acreage of saltmarsh habitat in each action area and across entire region
		Intertidal biotic community status and trends	Intertidal biotic communities sustained at ____ baseline conditions for each major shoreline habitat type
		Shoreline armoring of marine/nearshore habitats	Net decrease in extent of armored marine shoreline in each action area and across the entire region
	Freshwater habitats sustain diverse species and food webs and are formed by natural processes and human stewardship so that ecosystem functions are sustained	Physical habitat and freshwater parameters	Increase in number of stream miles/segments that meet water quality criteria for temperature, dissolved oxygen, pH, turbidity, fecal coliform, total suspended sediment, total phosphorus, and total nitrogen
		Maximum temperature in freshwater	Decrease in maximum temperature (7-day moving average between June and September) at all sampling locations in each water resource inventory area
		Channel armoring in freshwater habitats	Decrease in percent of channel length armored in each water resource inventory area
		Floodplain connectivity in freshwater habitats	Improved connectivity measures in each water resource inventory area
		Change in wetland acreage	Sustained (?) acreage of riverine, palustrine and lacustrine wetlands in each action area and across the entire region compared to ____ baseline
		Number of artificial fish barriers	Decrease in number of barriers caused by culverts, weirs, and man-made gradient changes in each water resource inventory area
		Fish passage barrier improvements	
	Terrestrial habitats sustain diverse species and food webs, sustain marine and freshwater habitats, and are formed by natural processes and human stewardship so that ecosystem functions are sustained	Old growth forest change	Achieving Puget Sound relevant objectives in Spotted Owl recovery plan and Northwest Forest Plan
		Transportation pressure	(1)No increase in number of road miles (by type) and road crossings within one mile of historically anadromous salmonid streams, floodplains, and marine shorelines (2)No decrease in miles where animals have potential to successfully cross transportation infrastructure
		Road densities	Decrease (?) in density of gravel and dirt roads in forest lands in each water resource inventory area
		Land cover status and trends	
	Non-native species do not significantly impair habitat quality, quantity, or the processes that form and maintain habitats	Non-native invasive aquatic marine species	Decrease in occurrence and areal coverage of Spartina, invasive tunicates, and other aquatic nuisance species

GOAL	DESIRED OUTCOME	PROVISIONAL INDICATOR	EXAMPLES OF WHAT SUCCESS MEANS...
5. An ecosystem that is supported by ground water levels as well as river and stream flow levels sufficient to sustain people, fish, and wildlife, and the natural functions of the environment. Short name: *Water for people, fish, and wildlife*	Freshwater quantity is sufficient to support freshwater and terrestrial food webs and human uses and enjoyment	Snow pack	
		Glacier mass balance	Sustained volume of monitored glaciers
		Annual maximum daily flow	No increase in maximum daily flow for 10 study streams
		Annual mean flow	No decrease in annual mean flow for 10 study streams
		Flow flashiness – TQmean	No increase in flow flashiness for 10 study streams
		Annual 7-day low flow	No decrease in 7-day low flow for 10 study streams
		Violations in agreed upon instream flows	Increase in percent compliance with established in-stream flows for each water resource inventory area
	Freshwater delivery to shorelines and estuaries supports estuarine, nearshore and marine food webs and the habitats upon which they depend	Stream flows to Puget Sound marine/nearshore habitat	No decrease in average daily freshwater inflow to Puget Sound from each of nine major rivers
	Flooding hazards do not harm people, residences, and transportation	Frequency of flood events	No increase in frequency of flood events
6. Fresh and marine waters and sediments of a sufficient quality so that the waters in the region are safe for drinking, swimming, shellfish harvest and consumption, and other human uses and enjoyment, and are not harmful to the native marine mammals, fish, birds, and shellfish of the region. Short name: *Water quality*	Loadings of toxics, nutrients, and pathogens do not exceed levels consistent with healthy ecosystem functions	Oil spills	1.Increasing trend in interval between major spills (>10,000 gallons) continues through 2020 2.Vessel incident rate remains below 1.2 (?) percent
		Toxics in biosolids from wastewater treatment plants	Decrease in mercury (and other contaminant) concentrations in biosolids
		Nutrient and pathogen loadings in rivers to Puget Sound	No increasing trend in calculated watershed loads of nitrate, ammonia, organic nitrogen, orthophosphate, organic phosphorus, total phosphorus, and fecal coliform bacteria
	Toxics in marine waters and sediments, and in mammals, fish, birds, shellfish, and plants in these waters, do not harm the persistence of these species	Chemical contamination in Puget Sound sediments	Increase in percent of Puget Sound sediments that meet Sediment Quality Standards
		Toxics in marine benthic fish	
		Toxics in marine pelagic fish	
		Liver disease in English sole	Decrease in risk of liver disease for English sole at eight stations
		Sediment quality triad index	Increase in percent of Puget Sound sediments characterized by sediment quality triad index as high quality
	Pathogens, nutrients, and ocean influences do not harm the mammals, fish, birds, shellfish, and plants that depend on the marine waters of Puget Sound	Fecal pollution index for commercial shellfish beds	1.No new shellfish growing areas have FPI values above 1 2.No decline by 2020 in conditions at the shellfish growing areas with FPI values above 1 3.10 percent of the shellfish growing areas with FPI values above 1 in 2005 improve significantly by 2015; 20 percent improve significantly by 2020.
		Marine water quality (multiple parameters)	1.Decrease in the spatial extent and persistence of low oxygen zones (oxygen concentrations below ocean - source water concentrations) 2.No decline in minimum oxygen concentrations
		Nutrients in marine waters	1.Seasonal nutrient concentrations (ammonia) are statistically indistinguishable from ocean source waters 2.Significant improvement in relative nutrient compositions by 2020
		Sensitivity to eutrophication in marine/nearshore habitats	
	Pathogens, nutrients, toxic contamination, sedimentation, elevated temperatures, and other water quality concerns do not harm fish, invertebrates, and wildlife that depend on the fresh waters of Puget Sound	Water quality parameters in streams aggregated by Water Quality Index (WQI)	WQI scores are 80 or higher in each water resource inventory area
		Toxics in freshwater fish	Decrease in concentrations of PAHs, PCBs, and mercury in edible tissues of freshwater fish

Question #2: What is the current status of Puget Sound and what are the biggest threats?

Goals:	Ecosystem Outcome	THREATENED BY: Habitat Alteration	Surface/GW Impacts	Pollution	Invasive Species	Artificial Propigation	Harvest	Natural Drivers
1. *A healthy human population*	Fish and shellfish are safe for people to eat			●				●
	Air is healthy for people to breathe			●				●
	Freshwaters are clean for drinking		●	●				○
	Marine and freshwaters are clean for contact		◒	●				
2. *Human well-being*	Aesthetic values, opportunities for recreation & access for the enjoyment of PS are continued & preserved	●	◒	●	◒	○	●	◒
	Terrestrial and marine resources are adequate to sustain the treaty rights, as well as the cultural, spiritual, subsistence, ceremonial, medicinal needs, and economic endeavors of the tribal communities of PS	●	○	●		●	●	●
	PS ecosystem supports thriving natural resource and marine industry uses such as agriculture, aquaculture, fisheries, forestry, and tourism	●		●	◒	◒	●	◒
	Economic prosperity is supported by and compatible with the protection and restoration of the ecosystem					●	●	●
3. *Healthy and sustaining species and food webs*	Viable marine, nearshore, freshwater, and terrestrial biological communities exist into the future and biodiversity is maintained	●	○	◒	◒	◒	◒	◒
	Populations of marine, nearshore, freshwater, and marine species are viable into the future	●	○	●	◒	●	●	◒
	Non-native1 species do not significantly reduce native species viability or impair food web function	●			●	◒		◒
	Biological harvests are balanced, viable and ecosystem-based	●	○	○	○	●	●	●
4. *Protected, restored, and sustainable habitats*	Marine/nearshore habitats sustain diverse species and food webs and are formed by natural processes and human stewardship so that ecosystem functions are sustained	●	○	●	●	◒	◒	◒
	Freshwater habitats sustain diverse species and food webs and are formed by natural processes and human stewardship so that ecosystem functions are sustained	●	●	●	●			◒
	Terrestrial habitats sustain diverse species and food webs, sustain aquatic habitats, and are formed by natural processes and human stewardship so that ecosystem functions are sustained	●	○	●	●	◒	●	◒
	Non-native species do not significantly impair habitat quality, quantity, or the processes that form and maintain habitats	◒			●	◒		◒
5. *Water for people, fish, and wildlife*	Freshwater quantity & flows support freshwater and terrestrial food webs and human uses and enjoyment	●	◒					○
	Freshwater delivery to shorelines and estuaries supports estuarine, nearshore and marine food webs and the habitats upon which they depend	●	◒					○
	Flooding hazards do not harm people, residences, and transportation	●	◒					
6. *Water quality*	Loadings of toxics, nutrients, and pathogens do not exceed levels consistent with healthy ecosystem functions	◒	◒	●		◒		◒
	Toxics in marine waters and sediments, and in mammals, fish, birds, shellfish, and plants in these waters do not harm the persistence of these species	◒		●				
	Pathogens, nutrients, and ocean influences do not harm the mammals, fish, birds, shellfish, and plants that depend on the marine waters of PS	◒	○	●		◒		●
	Pathogens, nutrients, toxic contamination, sedimentation, elevated temperatures, and other water quality concerns do not harm fish, invertebrates, and wildlife that depend on the fresh waters of PS	●	○	●		◒		●

● **primary threat to this outcome**

◒ **secondary threat to this outcome**

○ **indirectly threatens this outcome**

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